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Notes:

1. Untranslatable words are reported with asterisks (*).

2. Texts in the figures are not translated and shown as it is.

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CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1] A vehicle indoor heat environment detecting means which detects heat environment of the car interior of a room, comprising, A setting device which sets up a vehicle indoor heat circulation state, and a deflecting plate which can change the air blow-off direction into an air jet and which can be rocked, An air-conditioner for cars provided with a drive unit which rocks a deflecting plate, and a control device which drives said drive unit with a signal from said vehicle indoor heat environment detecting means and a setting device, and controls direction of said deflecting plate.

A means by which said control device makes a rocking range control continuously and-like [proportionally] according to size of a heat load detection signal from said vehicle indoor heat environment detecting means at least.

A means to make a rocking cycle control-like proportionally synchronizing with change of a rocking range.

[Detailed Description of the Invention]

The industrial invention of ***** relates to the air-conditioner for cars for making comfortable environment of the car interior of a room.

The air-conditioner for conventional technology cars brings a crew member comfortable environment on all climates and a travel condition, and protects the dull deposits of a window, and with frost, secures a driver's field of view, and aims at enabling safe and comfortable operation.

As a conventional air-conditioner for cars, there are some which were indicated, for example to JP,S57-15008,A, and this is shown in Fig. 5 and Fig. 6.

[this air-conditioner] A blow-off ***** style from these air ports 1 and 2 provided in the air ports 1 and 2 of the air-conditioner mainly. The air style deflection devices 3 and 4 which can be deflected between the first setting-out position made to blow off towards the crew member who has sat down on the seat, and the second setting-out position that makes said air style blow off towards the direction from which it swerves from the crew member who has sat down on the seat, It has the drive unit 5 which drives said air style deflection devices 3 and 4 between said first setting-out position and said second setting-out position, and the control device 6 which controls the operation of said drive unit 5 according to the difference of the preset temperature of an air-conditioner, and vehicle room temperature. Seven in a figure is a temperature setting final controlling element, and 8 is a vehicle room air temperature sensor.

And as shown in Fig. 6, the preset temperature Tset of the air-conditioner defined by the temperature setting final controlling element 7 and the vehicle room temperature Tr which the vehicle room air temperature sensor 8 detected are read, the temperature-gradient DT=Tr-Tset is computed, and this temperature-gradient DT is compared with the preset values B and A. At the time of DT>B, the air style deflection devices 3 and 4 are respectively brought to the first setting-out position, it is not DT>B and the air style deflection devices 3 and 4 are respectively brought to the second setting-out position at the time of DT<A. The drive unit 5 drives with the output signal y which is not DT>B, and a signal generation circuit generates for every predetermined time with a timer device when it is not DT<A. That is, when it is not DT<A, H signal and L signal are given to the drive unit 5 for every predetermined time, and the air style deflection devices 3 and 4 come to be respectively deflected repeatedly by the first setting-out position and the second setting-out position with a predetermined time ratio.

In the problem which an invention tends to solve, however the above-mentioned conventional air-conditioner, since the wind-direction range was constant when deflecting the air style deflection devices 3 and 4 repeatedly with a predetermined time ratio respectively, there is a problem which is described below. When the wind direction is always changed by fixed wind-direction within the limits even after vehicle room temperature becomes cooldown is completed and regular, ** concentrates on a crew member's specific part, it cannot cope with enough the height of the partial heat load by stay of a solar radiation or a wind, and vehicle indoor heat environment cannot be made comfortable it can not only become awfully clever, but, therefore comfortable-izing of vehicle indoor heat environment was hard to say that it is enough.

An object of this eye invention is to provide the air-conditioner for cars which can deflect the wind-direction range according to the height of heat load, in order to provide more comfortable vehicle indoor environment in view of the above-mentioned problem.

In order to attain the purpose of the means above for solving a problem, [the air-conditioner for cars concerning this invention] The vehicle indoor heat environment detecting means which detects the heat environment of the car interior of a room, and the setting device which sets up a vehicle indoor heat circulation state, The deflecting plate which can change the air blow-off direction into an air jet and which can be rocked, In the air-conditioner for cars provided with the drive unit which rocks a deflecting plate, and the control device which drives said drive unit with the signal from said vehicle indoor heat environment detecting means and a setting device, and controls direction of said deflecting plate, Said control device is characterized by considering it as the air-conditioner for cars provided with a means to make a rocking range control continuously and-like [proportionally] according to the size of the heat load detection signal from said vehicle indoor heat environment detecting means at least, and a means to make a rocking cycle control-like proportionally synchronizing with change of a rocking range.

Below an embodiment explains concretely the air-conditioner for cars concerning this invention based on the illustrated embodiment.

The instrument panel 13 is formed ahead of ***** 11 of the car interior of a room, and the passenger seat 12, and the air ports 14, 15, 16, and 17 for blowing off air toward back are formed in this instrument panel 13. The deflecting plates 18, 19, 20, and 21 which can be rocked freely are formed in these air ports 14, 15, 16, and 17 so that the blow-off direction of the air which blows off from these air ports 14, 15, 16, and 17 can be changed. It seems that the crew member

of 1 shall face across this rocking range, and this crew member's both sides shall be covered. As for these deflecting plates 18, 19, 20, and 21, the drive units 26, 27, 28, and 29 are coordinated via the levers 22, 23, 24, and 25, respectively. Although this example has shown as what performs both-way rectilinear motion, as long as these drive units 26, 27, 28, and 29 reciprocate, they are not rectilinear motion and may perform rocking movement. And the stroke which is that driving range is made variable, and these drive units 26, 27, 28, and 29 are made variable, the time, i.e., the drive cycle, which one round trip takes. Therefore, the rocking range and a rocking cycle can also change now the deflecting plates 18, 19, 20, and 21 coordinated with these drive units 26, 27, 28, and 29.

Among a figure, 30 are a bashful sensor as a vehicle indoor **** detection means to detect the heat environment of the car interior of a room, and the vehicle room temperature T_r is detected. As a factor which fluctuates the heat environment of the car interior of a room, outdoor air temperature, intensity of radiation, the vehicle speed, fan speed, or the number of crew members can be considered, and the sensor which detects these values can also be made into a vehicle indoor heat environment detecting means. 31 are the setting device provided in the instrument panel 13 among a figure, and the vehicle indoor goal setting temperature T_{set} as a vehicle indoor heat environmental state is set up.

Among a figure, 32 are a controller as a control device, the vehicle indoor goal setting temperature T_{set} set up by the vehicle room temperature T_r and the above-mentioned setting device 31 which were detected by the above-mentioned bashful sensor 30 is inputted, operation processing is performed and the output signal is inputted into said drive units 26, 27, 28, and 29. This controller 32 is provided with a means to make the rocking range of the deflecting plates 18, 19, 20, and 21 control continuously and-like [proportionally], and a means to make a rocking cycle control-like proportionally synchronizing with change of a rocking range.

Next, an operation is explained using the flow chart shown in Fig. 4.

If it switches on [which is not illustrated], the air-conditioner for cars concerning this invention will start an operation. The vehicle indoor goal setting temperature T_{set} and the vehicle room temperature T_r are read at Step 41, and the deviation ΔT is computed with a following formula at Step 42.

$$\Delta T = T_r - T_{set} \dots (1)$$

Next, based on deviation ΔT called for from (1) type, the deflecting-plate rocking cycle R is computed with a following formula at Step 43.

$$R = \Delta T \text{ and } A_1 + A_2 \dots (2)$$

A_1 and A_2 are constants, and they determine here that the deflecting-plate rocking cycle R becomes short as deviation ΔT becomes large.

Subsequently, similarly the deflecting-plate oscillation angle Q is computed with a following formula at Step 43.

$$\left. \begin{aligned} Q_{1L} &= \Delta T \cdot B_1 + B_2, & Q_{1R} &= \Delta T \cdot B_3 + B_4 \\ Q_{2L} &= \Delta T \cdot B_5 + B_6, & Q_{2R} &= \Delta T \cdot B_7 + B_8 \\ Q_{3L} &= \Delta T \cdot B_9 + B_{10}, & Q_{3R} &= \Delta T \cdot B_{11} + B_{12} \\ Q_{4L} &= \Delta T \cdot B_{13} + B_{14}, & Q_{4R} &= \Delta T \cdot B_{15} + B_{16} \end{aligned} \right\} \dots (3)$$

The angle to which the deflecting plate 18 rocks Q_{1L} with reference to Fig. 1 here to the position side shown with a broken line, The angle rocked to the position side which similarly shows Q_{1R} as a continuous line, the angle to which the deflecting plate 19 rocks Q_{2L} to the position side shown with a broken line, The angle rocked to the position side which similarly shows Q_{2R} as a continuous line, the angle to which the deflecting plate 20 rocks Q_{3L} to the position side shown as a continuous line, The angle rocked to the position side which shows Q_{3R} with a broken line, the angle which Q_{4L} rocks to the position side which the deflecting plate 21 shows as a continuous line, and Q_{4R} shall express the angle rocked to the position side similarly shown with a broken line, respectively. $B_1 - B_{16}$ are constants, and they determine that there is the deflecting-plate oscillation angle Q in the direction as for which the narrow range, i.e., always, is turning on the crew member as deviation ΔT becomes large. A change of the deflecting-plate rocking cycle R and the deflecting-plate oscillation angle Q is made by changing the drive cycle and driving range of the drive units 26, 27, 28, and 29, respectively.

And based on the deflecting-plate rocking cycle R computed at Step 43, and the deflecting-plate oscillation angle Q , the drive units 26, 27, 28, and 29 are driven, and the deflecting plates 18, 19, 20, and 21 are made to rock at Step 44. Among the flow chart of Fig. 4, although the deflecting-plate rocking cycle R and deflecting-plate oscillation angle Q_1 of the deflecting plate 18 are shown in Step 44, other deflecting plates 19, 20, and 21 operate in a similar manner.

Deviation ΔT shows the case where heat load is comparatively low, when comparatively small, deviation ΔT shows the case where heat load is comparatively expensive, when comparatively large, and deflecting-plate oscillation angle Q_1 is taken along an axis of ordinate, it takes the time t along an

axis of abscissa, and the diagrammatic chart 4a in Step 44 expresses the diagrammatic chart 4b. The diagrammatic chart 4a is compared with the diagrammatic chart 4b, when heat load is comparatively expensive, the deflecting-plate rocking cycle R is short, and deflecting-plate oscillation angle Q_1 is controlled to become small. That is, when heat load is comparatively expensive, as it is shown in Fig. 2, it is intensively ventilated by the crew member, and when heat load is comparatively low, it is spread from the air ports 14, 15, 16, and 17, and is made for the wind to have blown off, as shown in Fig. 3. As for the diagrammatic chart 4c, by the case where deviation ΔT is set to 0, the deflecting-plate rocking cycle R serves as the maximum in this case, and deflecting-plate oscillation angle Q_1 serves as the range of $Q_{1L0} = B_2$ and $Q_{1R0} = B_4$. In this example, since the deflecting-plate oscillation angle Q was

computed by the linear expression, the diagrammatic charts 4a and 4b are drawing the serrate waveform, but by computing by a quadratic expression and others, the deflecting plates 18, 19, 20, and 21 can be changed so that a sinusoidal wave and a rectangle wave may be drawn. And it is control-loop closing ***** so that it may return to Step 41 again, after repeating change of the deflecting plates 18, 19, 20, and 21 the time of four to 5 cycle. As for the deflecting-plate rocking cycle R , it is preferred to set it as about 6 to 30 seconds.

This example showed the thing using two or more drive units 26, 27, 28, and 29, as shown in Fig. 1, but you may make it make the deflecting plates 18, 19, 20, and 21 rock by one set of a drive unit. However, since it is controllable for every [each deflecting plates 18, 19, and 20 and] 21 if the drive units 26, 27, 28, and 29 are made to coordinate with each of the deflecting plates 18, 19, 20, and 21 like this example, the comfortable feeling of the car interior of a room can be raised more. Although this example showed what formed the deflecting plates 18, 19, 20, and 21 in the air ports 14, 15, 16, and 17 of the instrument panel 13, a deflecting plate may be formed in other air ports.

As beyond the effect explained, [the air-conditioner for cars concerning this invention] Since it has a means to make a rocking range control continuously

and-like [proportionally] according to the size of the heat load detection signal from a vehicle indoor heat environment detecting means at least, and a means to make a rocking cycle control-like proportionally synchronizing with change of a rocking range, The range to which an air conditioning wind is supplied can be continuously changed according to heat load, and, moreover, the cycle to which a wind is supplied will also change simultaneously in that case. For this reason, since not only the range to which a wind direction is supplied but its cycle changes simultaneously, the crew member who receives supply of the air conditioning style can feel the change corresponding to change of heat load, and can raise a comfortable feeling further.

That is, since a rocking range is narrowed, a cooling wind is intensively supplied in spot, when heat load becomes large temporarily under the influence of a solar radiation etc., and a rocking cycle also becomes short, a wind which was exactly instigated violently with the fan is supplied.

On the contrary, since a rocking range also spreads and a supply cycle also changes slowly when it changes into this stable air conditioning state where heat load is small, a comfortable air conditioning wind which is slowly fanned with a fan is obtained.

[Translation done.]